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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,693	02/10/2004	Victor Katsap	08850001AA	7391
30743	7590	05/25/2006	EXAMINER	
WHITHAM, CURTIS & CHRISTOFFERSON, P.C. 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			WILLIAMS, JOSEPH L	
			ART UNIT	PAPER NUMBER
			2879	

DATE MAILED: 05/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/774,693

Applicant(s)

KATSAP, VICTOR

Examiner

Joseph L. Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/29/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-9, 11-15, 17-22, 24, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim (US 4,528,474), of record by Applicant.

Regarding claim 1, Kim ('474) teaches in figure 4 and Example 2, a thermionic cathode (27) comprising a crystalline emitter (55) having a tip (29) and a cone (no number); and a carbon coating (56) applied to the outer surface of said cone.

Regarding claim 2, Kim ('474) teaches a crystalline emitter is single crystal Lanthanum Hexaboride (LaB<sub>6</sub>) (see Example 2).

Regarding claim 3, Kim ('474) teaches cone has a cone angle in the range of 20 to 60 degrees (read cone angle less than 60 degrees, column 7, lines 42-43).

Regarding claim 5, Kim ('474) teaches the cone has a surface micro- roughness and wherein said carbon coating has a thickness of a least twice said micro-roughness (read all surfaces have a roughness, even if roughness equals zero. Therefore, any thickness would be greater than zero).

Regarding claim 6, Kim ('474) teaches the thickness is 2 microns (column 10, lines 18-19).

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Regarding claim 7, Kim ('474) teaches an improvement in a thermionic cathode (27) having a crystalline emitter (55) with a tip (29) and a cone (no number), the improvement comprising: a carbon coating (56) applied to an outer surface of said cone.

Regarding claim 8, Kim ('474) teaches a crystalline emitter is single crystal Lanthanum Hexaboride ( $\text{LaB}_6$ ) (see Example 2).

Regarding claim 9, Kim ('474) teaches cone has a cone angle in the range of 20 to 60 degrees (read cone angle less than 60 degrees, column 7, lines 42-43).

Regarding claim 11, Kim ('474) teaches the cone has a surface micro-roughness and wherein said carbon coating has a thickness of a least twice said micro-roughness (read all surfaces have a roughness, even if roughness equals zero. Therefore, any thickness would be greater than zero).

Regarding claim 12, Kim ('474) teaches the thickness is 2 microns (column 10, lines 18-19).

Regarding claim 13, Kim ('474) teaches in figures 1 and 4, and in example 2, an electron emission apparatus, comprising a thermionic cathode (27) comprising a crystalline emitter (55) having a tip (29) and a cone (no number); and a carbon coating (56) applied to the outer surface of said cone; an emitter heater (23, 23'), and a support (20) for said crystalline emitter.

Regarding claim 14, Kim ('474) teaches a crystalline emitter is single crystal Lanthanum Hexaboride ( $\text{LaB}_6$ ) (see Example 2).

Regarding claim 15, Kim ('474) teaches cone has a cone angle in the range of 20 to 60 degrees (read cone angle less than 60 degrees, column 7, lines 42-43).

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Regarding claim 17, Kim ('474) teaches the cone has a surface micro- roughness and wherein said carbon coating has a thickness of a least twice said micro-roughness (read all surfaces have a roughness, even if roughness equals zero. Therefore, any thickness would be greater than zero).

Regarding claim 18, Kim ('474) teaches the thickness is 2 microns (column 10, lines 18-19).

Regarding claim 19, Kim ('474) teaches a method of manufacturing a crystalline emitter for use in a thermionic cathode, comprising the step of applying a carbon coating to an outer surface of a cone of said crystalline emitter.

Regarding claim 20, Kim ('474) teaches the carbon coating contains no pinholes (It is known in the art that .1 microns is the minimum thickness to apply carbon to prevent pinholes).

Regarding claim 21, Kim ('474) teaches a crystalline emitter is single crystal Lanthanum Hexaboride ( $\text{LaB}_6$ ) (see Example 2).

Regarding claim 22, Kim ('474) teaches cone has a cone angle in the range of 20 to 60 degrees (read cone angle less than 60 degrees, column 7, lines 42-43).

Regarding claim 24, Kim ('474) teaches the cone has a surface micro- roughness and wherein said carbon coating has a thickness of a least twice said micro-roughness (read all surfaces have a roughness, even if roughness equals zero. Therefore, any thickness would be greater than zero).

Regarding claim 25, Kim ('474) teaches the thickness is 2 microns (column 10, lines 18-19).

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 10, 16, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (US 4,528,474), of record by Applicant.

Regarding claims 4, 10, 16, and 23, Kim ('474) teaches all of the claimed limitations except for the teaching of pyrolytic carbon or diamond-like carbon as the carbon coating.

However, further regarding claims 4, 10, 16, and 23, Kim ('474) teaches in column 6, lines 33-36, that the coating on the cone should have a work function, low vapor pressure and a high melting point, but also hardly reacts chemically with the thermoelectron emissive material at an operational temperature. It is known in the art of field emission that both claimed carbons meet these limitations, thus one of ordinary skill in the art would know to use either pyrolytic carbon or diamond-like carbon for the purpose of having a coating which has a work function, low vapor pressure and a high melting point, but also hardly reacts chemically with the thermoelectron emissive material at an operational temperature.

Hence it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the either pyrolytic carbon or diamond-like carbon for the

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carbon coating on the thermionic cathode of Kim for the purpose of having a coating which has a work function, low vapor pressure and a high melting point, but also hardly reacts chemically with the thermoelectron emissive material at an operational temperature.

### ***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Early et al. (US 5,356,662) teaches the state of the art for the thickness coating of carbon.


### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph L. Williams whose telephone number is (571) 272-2465. The examiner can normally be reached on M-F (6:30 AM-3:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Joseph L. Williams  
Primary Examiner  
Art Unit 2879